

reupholstery, solidifying employment at the current level. Nevertheless, a steady demand will continue to exist for upholsterers to restore very valuable furniture. Unlike many other production occupations, automation is not expected to reduce employment opportunities substantially in this occupation, because most upholstery work is labor-intensive and is not easily automated.

Employment of upholsterers in automobile repair has been declining for some time, although the rate of decline should slow. The widespread use of more durable fabrics for automobile seat covers, soft-tops, and convertibles is responsible, in part, for the loss of workers in this industry. This decline may be partially offset in coming years by the reemergence of the luxury automobile, especially those with leather upholstery and convertible tops. Despite little or no change in overall employment of upholsterers, job openings should arise from the need to replace experienced workers who transfer to other occupations or leave the labor force.

Earnings

Median annual earnings of upholsterers were \$22,050 in 1998; the middle 50 percent earned between \$17,800 and \$26,920. The lowest

10 percent earned less than \$14,160, while the top 10 percent earned over \$33,150. Median annual earnings in the household furniture industry were \$21,300, and workers performing reupholstery and furniture repair received a median annual salary of \$22,500 in 1997. Earnings of self-employed upholsterers depend on the size and location of the shop and on the number of hours worked.

Related Occupations

Other workers who combine manual skills and knowledge of materials such as fabrics and wood are fur cutters, furniture finishers, pattern and model makers, and casket coverers.

Sources of Additional Information

For details about work opportunities for upholsterers in your area, contact local upholstery shops or the local office of the State employment service.

To receive a list of technical schools with accredited programs in upholstery, contact:

Accrediting Commission of Career Schools and Colleges of Technology, 2101 Wilson Blvd., Suite 302, Arlington, VA 22201. Internet: <http://www.accsc.org>

Woodworking Occupations

(O*NET 89302A, 89302C, 89305, 89308, 89311, 89314, 89397A, 89397B, 89398, 92302, 92305, 92308, 92311, and 92314)

Significant Points

- Overall employment is projected to decline; increasing automation and imports will result in a decrease among woodworking machine operators, while demand for customized wood products will spur minimal growth among precision woodworkers.
- Job prospects will be best for highly skilled workers and those with knowledge of computer-controlled machine tool operation.
- Most woodworkers are trained on the job; basic machine operations may be learned in a few months, but becoming a skilled woodworker often requires 2 or more years.

Nature of the Work

In spite of the development of sophisticated composites and alloys, the demand for wood products continues unabated. Helping to meet this demand are production and precision woodworkers. Production woodworkers can be found in primary industries, such as sawmills and plywood mills, as well as in secondary industries that manufacture furniture, kitchen cabinets, musical instruments, and other fabricated wood products. Precision woodworkers, on the other hand, usually work in small shops that make architectural woodwork, furniture, and many other specialty items.

Production workers usually set up, operate, and tend woodworking machines—such as power saws, planers, sanders, lathes, jointers, and routers—to cut and shape components from lumber, plywood, and other wood panel products. Working from blueprints, supervisors' instructions, or shop drawings that woodworkers themselves produce, woodworkers first determine the best method of shaping and assembling parts. Before cutting, they must often measure and mark the materials. They also verify dimensions to adhere to specifications and may trim parts using handtools such as planes, chisels, wood files, or sanders to insure a tight fit. Most production woodworkers operate a specific

woodworking machine, but some are responsible for a variety of machines. Lower skilled operators may merely press a switch on a woodworking machine and monitor the automatic operation, whereas more highly skilled operators set up equipment, cut and shape wooden parts, and verify dimensions using a template, caliper, or rule. In sawmills, machine operators cut logs into planks, timbers, or boards. In veneer mills, they cut veneer sheets for making plywood from logs. And in furniture plants, woodworkers make furniture components, such as table legs, drawers, rails, and spindles.

The next step in the manufacturing process is the production of subassemblies using fasteners and adhesives. The pieces are then brought together to form a complete unit. The product is then finish sanded, stained, and if necessary, coated with a sealer, such as lacquer or varnish. Woodworkers may perform this work in teams or be assisted by a helper.

All woodworkers are employed at some stage of the process through which logs of wood are transformed into finished products. Some of these workers produce the structural elements of buildings; others mill hardwood and softwood lumber; still others assemble finished wood products. They operate machines that cut, shape, assemble, and finish raw wood to make the doors, windows, cabinets, trusses, plywood, flooring, paneling, molding, and trim that are components of most homes. Others may fashion home accessories, such as beds, sofas, tables, dressers, and chairs. In addition to these household goods, woodworkers also make sporting goods, including baseball bats, racquets, and oars, as well as musical instruments, toys, caskets, tool handles, and thousands of other wooden items.

Woodworkers have been greatly affected by the introduction of computer-controlled machinery. This technology has raised worker productivity, by allowing one operator to simultaneously tend a greater number of machines. With computerized numerical controls, an operator can program a machine to perform a sequence of operations automatically, resulting in greater precision and reliability. The integration of computers with equipment has improved production speeds and capabilities, simplified setup and maintenance requirements, and increased the demand for workers with computer skills.

While this costly equipment has had a great impact on workers in the largest, most efficient firms, precision or custom woodworkers—who generally work in smaller firms—have continued to employ the same production techniques they have used for many years. These workers—

such as cabinetmakers, model makers, wood machinists, and furniture and wood finishers—work on a customized basis, often building one-of-a-kind items. Precision woodworkers usually perform a complete cycle of tasks, cutting, shaping, surface preparation, and assembling prepared parts of complex wood components into a finished wood product. For this reason, these workers normally need substantial training and an ability to work from detailed instructions and specifications. In addition, they often are required to exercise independent judgment when undertaking an assignment.

Precision woodworkers produce many varieties of woods from basic household furniture to custom office furniture. Making furniture by hand is a demanding and time-consuming endeavor, but one that can award great gratification. Wood is a vastly rich material and comes in many different colors, patterns, and textures, requiring different methods of working. Whether creating simple, classic pieces or sculptured furnishings, precision woodworkers discover the many facets of wood.

Working Conditions

Working conditions vary by industry and specific job duties. In primary industries, such as logging and sawmilling, working conditions are physically demanding, due to the handling of heavy, bulky material. Workers in these industries may also encounter excessive noise and dust and other air pollutants. However, using earplugs and respirators may somewhat control these factors. Also, rigid adherence to safety precautions minimizes risk of injury from contact with rough woodstock, sharp tools, and power equipment. The risk of injury is also lowered by the installation of computer-controlled equipment, which reduces the physical labor and hands-on contact with the machine.

In secondary industries, such as furniture and kitchen cabinet manufacturing, working conditions also depend on the industry and the particular job. Employees who operate machinery must often wear ear and eye protection, follow operating safety instructions, and use safety shields or guards to prevent accidents. Those who work in the finishing area must either be provided with an appropriate dust or vapor mask, a complete protective safety suit, or work in a finishing environment that removes all vapors and particle matter from the atmosphere. Prolonged standing, lifting, and fitting heavy objects are common characteristics of the job.

Employment

Woodworkers held about 372,000 jobs in 1998. Self-employed woodworkers, mostly cabinetmakers and furniture finishers, accounted for 43,000 of these jobs. Employment was distributed as follows:

Woodworkers, precision	229,000
Woodworking machine setters and operators	143,000
Head sawyers	64,000
Woodworking machine operators	79,000



Woodworkers may use sanders to cut and shape components from lumber, plywood, and other wood panel products.

Nearly 82 percent of salaried woodworkers were employed in manufacturing industries. Among these woodworkers, 29 percent were found in establishments fabricating household and office furniture and fixtures and almost 50 percent worked in lumber and wood products, manufacturing a variety of raw, intermediate, and finished woodstock. Wholesale and retail lumber dealers, furniture stores, reupholstery and furniture repair shops, and construction firms also employ woodworkers.

Woodworking jobs are found throughout the country. However, production jobs are concentrated in the South and Northwest, close to the supply of wood, whereas furniture makers are more prevalent in the East. Custom shops can be found everywhere, but are generally concentrated in or near highly populated areas.

Training, Other Qualifications, and Advancement

Most woodworkers are trained on the job, picking up skills informally from experienced workers. Some acquire skills through vocational education or by working as carpenters on construction jobs. Others may attend colleges or universities that offer training in areas including wood technology, furniture manufacturing, wood engineering, and production management. These programs prepare students for positions in production, supervision, engineering, and management.

Beginners usually observe and help experienced machine operators. They may supply material to or remove fabricated products from machines. Trainees also do simple machine operating jobs, while at first closely supervised by experienced workers. As beginners gain experience, they perform more complex jobs with less supervision. Some may learn to read blueprints, set up machines, and plan the sequence of the work. Most woodworkers learn basic machine operations and job tasks in a few months, but becoming a skilled woodworker often requires 2 or more years.

Employers increasingly seek applicants with a high school diploma or the equivalent, because of the growing sophistication of machinery and the constant need for retraining. Persons seeking woodworking jobs can enhance their employment and advancement prospects by completing high school and receiving training in mathematics, science, and computer applications. Other important qualities for entrants in this occupation include mechanical ability, manual dexterity, and the ability to pay attention to detail.

Advancement opportunities are often limited and depend upon availability, seniority, and a worker's skills and initiative. Sometimes experienced woodworkers become inspectors or supervisors responsible for the work of a group of woodworkers. Production workers can often advance into these positions by assuming additional responsibilities and by attending workshops, seminars, or college programs. Those who are highly skilled may set up their own woodworking shops.

Job Outlook

Employment of woodworkers is expected to decline through the year 2008. Whereas employment of lesser-skilled woodworking machine operators is expected to decline, limited growth is expected among higher-skilled precision woodworkers. However, thousands of openings will arise each year because of the need to replace experienced woodworkers who transfer to other occupations or leave the labor force.

Demand for woodworkers will stem from increases in population, personal income, and business expenditures, in addition to the continuing need for repair and renovation of residential and commercial properties. Therefore, opportunities should be particularly good for woodworkers who specialize in such items as moldings, cabinets, stairs, and windows. Prospects will be best for highly skilled woodworkers with knowledge of computer-controlled machine tool operation.

Several factors may limit the growth of woodworking occupations. Technological advances, like robots and computerized numerical control machinery, will prevent employment from rising as fast as the demand for wood products, particularly in the mills and manufacturing plants where many processes can be automated. In addition, some jobs in the United States will be lost, as imports continue to grow and as U.S. firms move some production to other countries. Also, the demand for wood

may be reduced somewhat, as materials such as metal, plastic, and fiber-glass continue to be used in many products as alternatives to wood. Environmental measures designed to control various pollutants used in, or generated by, woodworking processes may also impact employment, especially in secondary industries, such as household furniture. Because of these trends, employment opportunities in primary wood industries could be more limited than those in secondary industries.

Employment in all woodworking occupations is highly sensitive to economic cycles; and during economic downturns, workers are subject to layoffs or a reduction in hours.

Earnings

Median annual earnings of wood machinists were \$19,980 in 1998. The middle 50 percent earned between \$16,170 and \$23,920. The lowest 10 percent earned less than \$13,380 and the highest 10 percent earned more than \$28,590. Median annual earnings in the industries employing the largest numbers of wood machinists in 1997 are shown below:

Millwork, plywood, and structural members	\$19,500
Household furniture	19,000

Median annual earnings of cabinetmakers and bench carpenters were \$22,390 in 1998. The middle 50 percent earned between \$17,870 and \$28,250. The lowest 10 percent earned less than \$14,260 and the highest 10 percent earned more than \$35,880. Median earnings in the industries employing the largest numbers of cabinetmakers and bench carpenters in 1997 are shown below:

Residential building construction	\$26,400
Partitions and fixtures	23,700
Carpentry and floor work	22,600
Millwork, plywood, and structural members	21,300
Furniture and homefurnishings stores	21,200
Household furniture	18,500

Median annual earnings of woodworking machine operators and tenders, setters and set-up operators were \$19,260 in 1998. The middle 50 percent earned between \$15,600 and \$22,910. The lowest

10 percent earned less than \$13,260 and the highest 10 percent earned more than \$27,060. Median annual earnings in the industries employing the largest numbers of woodworking machine operators and tenders, setters and set-up operators in 1997 are shown below:

Millwork, plywood, and structural members	\$19,500
Sawmills and planing mills	18,500
Household furniture	18,300
Miscellaneous wood products	17,000

Earnings vary by industry, geographic region, skill, educational level, and complexity of machinery operated. In 1998, median annual earnings were \$19,490 for head sawyers and sawing machine operators and tenders; \$19,880 for furniture finishers; and \$22,430 for all other precision woodworkers.

Some woodworkers, such as those in logging or sawmills, who are engaged in processing primary wood and building materials, are members of the International Association of Machinists. Others belong to the United Furniture Workers of America or the United Brotherhood of Carpenters and Joiners of America.

Related Occupations

Many woodworkers follow blueprints and drawings and use machines to shape and form raw wood into a final product. Workers who perform similar functions working with other materials include precision metalworkers, metalworking and plastics-working machine operators, metal fabricators, molders and shapers, and leather workers.

Sources of Additional Information

For information about woodworking occupations, contact local furniture manufacturers, sawmills and planing mills, cabinetmaking or millwork firms, lumber dealers, a local of one of the unions mentioned above, or the nearest office of the State employment service.

For general information about furniture woodworking occupations, contact:

- ✦ American Furniture Manufacturers Association, Manufacturing Services Division, P.O. Box HP-7, High Point, NC 27261.
- Internet: <http://www.afmahp.org>

Miscellaneous Production Occupations

Dental Laboratory Technicians

(O*NET 89921)

Significant Points

- Employment should increase slowly, as the public's improving dental health requires fewer dentures but more bridges and crowns.
- Dental laboratory technicians need artistic aptitude for detailed and precise work, a high degree of manual dexterity, and good vision.

Nature of the Work

Dental laboratory technicians fill prescriptions from dentists for crowns, bridges, dentures, and other dental prosthetics. First, dentists send a specification of the item to be fabricated, along with an impression (mold) of the patient's mouth or teeth. Then dental laboratory technicians, also called dental technicians, create a model of the patient's mouth, by pouring plaster into the impression and allowing it to set. Next, they place the model on an apparatus that mimics the bite and movement of the patient's jaw. The model serves as the basis of the prosthetic device. Technicians examine the model, noting the size and

shape of the adjacent teeth, as well as gaps within the gumline. Based upon these observations and the dentist's specifications, technicians build and shape a wax tooth or teeth model, using small hand instruments called wax spatulas and wax carvers. They use this wax model to cast the metal framework for the prosthetic device.

Once the wax tooth has been formed, dental technicians pour the cast and form the metal, and using small hand-held tools, prepare the surface to allow the metal and porcelain to bond. They then apply porcelain in layers, to arrive at the precise shape and color of a tooth. Technicians place the tooth in a porcelain furnace to bake the porcelain onto the metal framework, then adjust the shape and color, with subsequent grinding and addition of porcelain to achieve a sealed finish. The final product is a near exact replica of the lost tooth or teeth.

In some laboratories, technicians perform all stages of the work, whereas in other labs, each technician does only a few. Dental laboratory technicians can specialize in one of five areas: Orthodontic appliances, crowns and bridges, complete dentures, partial dentures, or ceramics. Job titles can reflect specialization in these areas. For example, technicians who make porcelain and acrylic restorations are called *dental ceramists*.

Working Conditions

Dental laboratory technicians generally work in clean, well lighted, and well-ventilated areas. Technicians usually have their own workbenches, which can be equipped with Bunsen burners, grinding and